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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/444,034	11/19/1999	RAMAKRISHNA PATTIKONDA	1152-0009	8104

7590 02/10/2003
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EXAMINER

LAROSE, COLIN M

ART UNIT	PAPER NUMBER
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2623

DATE MAILED: 02/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/444,034

Applicant(s)

PATTIKONDA ET AL.

Examiner

Colin M. LaRose

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Arguments and Amendments

1. Applicants' arguments and/or amendments filed 2 January 2003, have been entered and made of record.
2. Applicant's arguments have been fully considered, but they are not persuasive. Examiner appreciates the differences between the present invention and the prior art of record. However, Applicant has described how the invention differs from the cited prior art rather than how the claimed invention differs from the cited prior art. The amended claims, broadly interpreted, are still believed to be an obvious combination of the cited prior art.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 1-5 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintani and Admission.

Regarding claims 1 and 9, Shintani discloses an optical inspection system for inspecting at least one structure of an object, said system comprising:

a first visual light source (green light source 3, figure 1a) that illuminates the surface of the object and the structure with light at a first visual frequency (i.e. green);

a first coherent light source (blue laser light source 5, figure 1a) that illuminates the surface of the object with a narrow coherent light beam (blue beam 6, figure 1a) creating an

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illumination path, substantially simultaneously with illumination by the first visual light source, said coherent light beam being at a second visual frequency (i.e. blue) that is different from the first visual frequency of the visual light source, said first coherent light source being mounted such that illumination path created by the coherent light beam can be directed over an area of interest (spots 10, 13, figures 1c, 1d) on the surface of the object;

a color camera (color TV camera 8, figure 1a) mounted above the object, said camera having a first channel that captures an image of the illuminated surface of the object and the structure at the first visual frequency, and a second channel that captures a path of the coherent light beam as it strikes the surface of the object and the structure at the second visual frequency [While not expressly disclosed by Shintani, color cameras were commonly capable of capturing images at green and blue frequencies through first and second color channels. Official notice taken.]; and

a computer (element 17, figure 5a, or alternatively element 8, which computes a measure of the radiant energy of the object's surface, said measure containing information pertaining to the height of the structure) that determines height information for the structure from the image reflected of the coherent light beam at the second visual frequency (column 4, line 66 through column 5, line 5: spot reflected by green beam is used for determining height information).

Shintani does not expressly disclose that the first coherent light source is on a movable mount. Shintani discloses that all three lights "can be automatically displaced by certain means so as to change the incident angles thereof... to carry out the circuit board visual inspection method with a high degree of accuracy." Based on this teaching, one of ordinary skill in the art at

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the time the invention was made would have been motivated to use a movable mount in order to displace the paths of the beams.

Shintani is silent to determining 2-D structure information from the image at the first visual frequency. However, techniques for determining 2-D structure information for inspection purposes were well-known in the art at the time of the invention, and the motivations for determining 2-D information of structures for the purposes of inspection (e.g. determining length and width for dimensional tolerance analysis) were obvious to those of skill in the art. Applicant discloses that determining 2-D information using a light source was well-known and omits details of the conventional techniques used for determining 2-D information (Specification page 2, line 20 through page 3, line 2, and page 10, lines 7-10). In view of Applicant's Admission, it would have been obvious to determine 2-D structure information from an image of the structure at the first visible frequency.

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Regarding claims 2 and 10, Shintani discloses a second visual light source (red light source 1, figure 1a) for illuminating the surface of the object and the structure with light at a third visual frequency (i.e. red).

Regarding claims 3 and 11, Shintani does not expressly disclose the color camera includes a third channel that captures an image of the illuminated surface of the object and the structure at the third visual frequency, however, at the time the invention was made, 3-channel color cameras that capture reflected visible light in red, green, and blue channels were widely used by those of skill in the art. Official notice taken.

Regarding claim 4 and 12, Shintani does not expressly disclose the computer also determining 2-D structure information from the image at the third visual frequency, however, on page 10, lines 7-10 of the Specification, Applicant discloses that determining 2-D structure information from two visual light sources was common in the art. As stated above, motivation to determine 2-D structure information for inspection purposes was obvious to those of skill in the art the time the invention was made.

Regarding claims 5 and 13, Shintani does not disclose the color camera includes means for making a continuous series of exposures as the camera scans the surface of the object, however, this is an inherent feature of color TV cameras, which create a series of exposures at 60 frames per second.

5. Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintani, Admission, and Decavel.

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Regarding claims 6 and 14, Shintani is silent to varying the length of each exposure of the color camera.

Decavel discloses an inspection system that utilizes a TV camera capable of different exposure lengths (column 2, lines 28-36).

It would have been obvious to one of ordinary skill in the art at the time of the invention to replace Shintani's camera with Decavel's adjustable exposure camera since, at the time the invention was made, varying exposure lengths was a well-known imaging technique for controlling the quality of images.

6. Claims 7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintani, Admission, and Sayag.

Regarding claims 7 and 15, Although Shintani is silent to the computer including means for integrating the height information over the length of an exposure to calculate average height, this limitation is a common feature of imaging devices that were known at the time the invention was made.

Sayag provides a general background of the functionality of semiconductor imaging devices, such as CCDs. Sayag teaches that CCDs capture images, inter alia, by accumulating charges during an integration (exposure) period, and the amount of charge accumulated provides a measure of the average radiant energy (column 1, lines 37-40). Therefore, information pertaining to height (e.g. light spots 11,12,13 in figure 1d of Shintani) are average values due to the integration performed by the CCD. Thus height H is also an average value for the length of an exposure period since H is derived from the averaged light spots 11,12,13.

7. Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintani, Admission, and U.S. Patent 3,187,185 by Milnes.

Regarding claims 8 and 16, Shintani discloses a second coherent light source (red laser source 2, figure 1a) mounted on a side of the object which is displaced ϕ degrees from the first coherent light source, said second laser light source illuminating the surface of the object in a path that is offset by ϕ degrees from the path illuminated by the first coherent light source.

Shintani is silent to the light sources being displaced by 90 degrees and the light sources illuminating in perpendicular paths as exemplified in figure 1 of the present invention.

Milnes discloses a similar inspection system for determining the dimensions of a structure. In particular, figure 5 shows light beam sources 18 and 24 directed towards a surface, wherein the beams are perpendicular with respect to each other. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Shintani by Milnes to displace the mounted light sources by 90 degrees and illuminate the object with perpendicular beam paths since Milnes shows that aligning the beams at a 90 degree angle achieves substantially the same results as aligning the beams at other angles in that the dimensions of the object can be accurately determined.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489. The examiner can normally be reached Monday through Thursday from 8:00 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314. •

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (703) 306-0377.



AMELIA M. AU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

CML

Group Art Unit 2623

3 February 2003